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Subject: Abstract for CD-workshop
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Howdy,

I have written up an abstract for the CD-workshop. Take a look and see what you think. I will submit it when I get back from Nice.

Have a great few weeks!

Cheers,

- Bill

Tidal Distortion and Disruption of Rubble-Pile Asteroids: Evidence and Applications

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``Rubble-pile" asteroids, defined as a loose collections of smaller components held together by self-gravity rather than tensile strength, are now considered common among rocky bodies larger than 250 m (Love and Ahrens 1996). Since these bodies frequently make close slow encounters with the Earth and other terrestrial planets, they should be susceptible to both distortion and disruption by planetary tidal forces. We have tested this hypothesis, and our method and results are described by Richardson et al. (this issue). We now apply those results to explain unusual craters and asteroids in the terrestrial planet region. They are:

(1) One or two catena-type crater chains have been observed on the near side of the Moon which are not thought to be secondary ejecta (Melosh and Whitaker, 1994, Nature 369, 713.). Bottke et al. (1997, Icarus 126, 470.) showed that ``SL9-type" disruptions near Earth have produced at least one crater chain on the Moon over the last 3.8 Gyr, consistent with observations.

(2) Doublet craters, formed by two nearby bodies impacting a planetary surface at nearly the same time, have been observed on nearly all the terrestrial planets (Bottke and Melosh, 1996, Nature 381, 51). They are probably produced by the impact of binary asteroids. We will show that binaries are common endstates of mass shedding events, where fragments are injected small orbits around the remnant rubble-pile by planetary perturbations. Our tests indicate that as many as 15% of the km-sized ECO population are binaries produced by tidal forces. Reports of ECO binaries with orbital parameters well suited for tidal disruption (e.g., Pravec and Hahn, 1997, Icarus 127, 431.) lend additional credibility to our claim.

(3) Delay-Doppler radar images of Earth-crossing asteroid 1620 Geographos show it has a very elongated shape (1.5 by 4.0 km; Ostro et al., 1995, Nature 375, 474.), a fast rotation period (P = 5.22 h), and an unusual silhouette which makes it look like a ``pinwheel". Our results show that weak tidal disruption events can stretch and spun-up a rubble-pile until it takes on many of Geographos's physical characteristics (Richardson et al. 1998, Icarus, in press.). We suggest that 433 Eros, which has an shape and spin rate comparable to Geographos, may have also undergone tidally distortion.